



Is the intestinal microbiota in rainbow trout (*oncorhynchus mykiss*) influenced by diet type and challenge by *yersinia ruckeri*?

Ingerslev, Hans-Christian; Dalsgaard, Inger; Jørgensen, Louise von Gersdorff; Madsen, Lone

Publication date:
2013

[Link back to DTU Orbit](#)

Citation (APA):

Ingerslev, H-C., Dalsgaard, I., Jørgensen, L. V. G., & Madsen, L. (2013). *Is the intestinal microbiota in rainbow trout (*oncorhynchus mykiss*) influenced by diet type and challenge by *yersinia ruckeri*?*

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

IS THE INTESTINAL MICROBIOTA IN RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) INFLUENCED BY DIET TYPE AND CHALLENGE BY *YERSINIA RUCKERI*?

Hans-Christian Ingerslev¹, Inger Dalsgaard¹, Louise von Gersdorff Jørgensen² & Lone Madsen¹

¹National Veterinary Institute, Technical University of Denmark, Frederiksberg C, Denmark. E-mail: hain@vet.dtu.dk.

²Laboratory of Aquatic Pathobiology, Section of Biomedicine, Faculty of Health and Medical Sciences, University of Copenhagen, Frederiksberg C, Denmark.

In recent years it has become more and more evident that the bacterial flora in the gut of warm-blooded animals modulates physiological processes and the immunological status of the host. Besides effects on growth parameters, commensal intestinal bacteria balance the immune system and prevent colonization of pathogenic bacteria. The question is if the gut microbiota is also important in lower vertebrates such as fish? And does it play a role in connection to pathogenic challenge? To examine these questions rainbow trout fry were fed two different diets of either a marine or vegetable origin directly after first feeding. At a size of about four gram the fish were bath challenged by *Yersinia ruckeri* and intestines were then sampled 5 and 18 days post challenge for subsequent metagenomic and immunological examinations. Next-generation sequencing was applied for the metagenomic studies using the Illumina HiSeq platform. The results clearly showed two different microbial patterns in the intestines dependent on the diet type. Control fish fed a marine based diet overall had a higher amount of proteobacteria, while high amount of reads belonging to phylum Firmicutes dominated in the intestines of vegetable fed fish. Several genera within the order Lactobacillales belonged to the many reads from Firmicutes. In challenged fish with a high load of reads from genus *Yersinia* there was a significantly lower amount of reads from the order Burkholderiales. Further, these fish further clustered separately when analyzing the bacterial community on a PCA plot. The immunological examinations using RT-qPCR showed no different expression patterns between the diet groups in control fish, but the response was very different in connection to challenge. Here, the general pattern was a pro-inflammatory response in the intestine of marine fed fish challenged with *Yersinia ruckeri*, while several immune genes were down-regulated in vegetable fed fish. Overall, the results indicate that the gut microbiota in rainbow trout is highly plastic according to the type of diet and does further seem to be involved in the immunological response in connection to pathogenic challenge.